



La Nina & the Floods of 2011 **Western Montana**

by

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weather.gov



NOAA National Weather Service



Overview

- **La Nina**
 - *Snowpack correlation*
 - *Flood correlation*
- **Floods of 2011**
 - *Clark Fork River Basin*



Weather Pattern

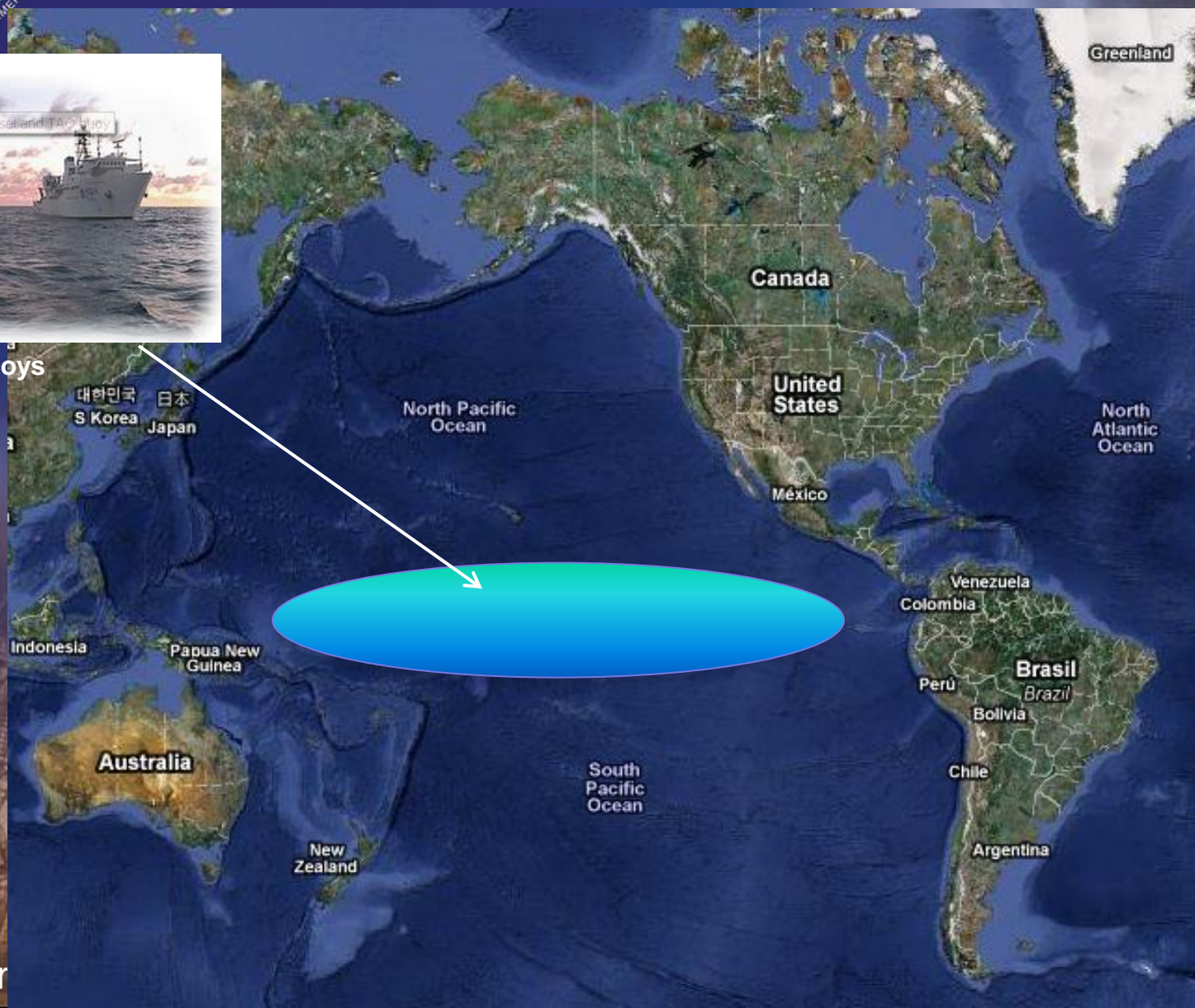
Water Year 2011



La Nina - Measured

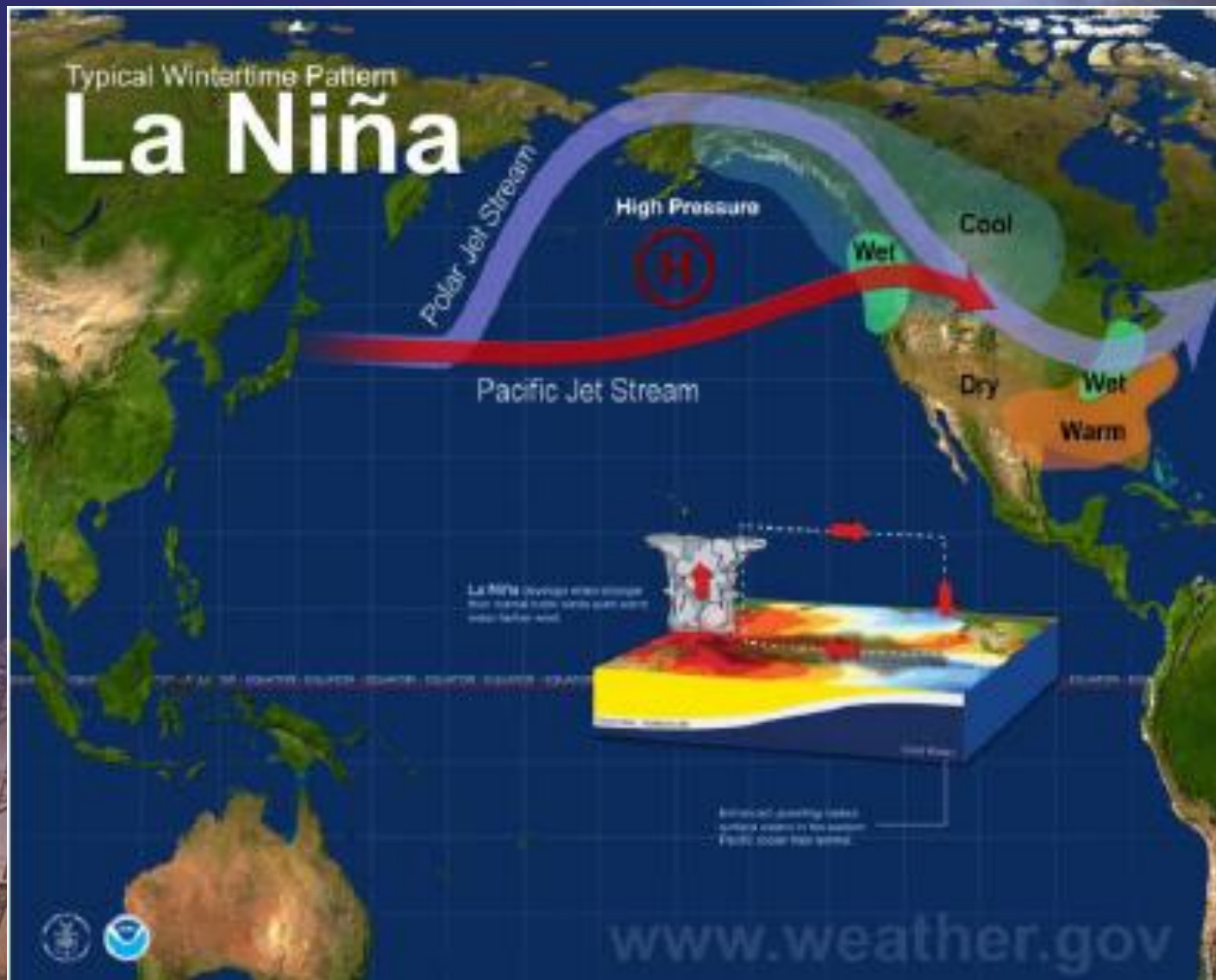


70 Ocean Buoys



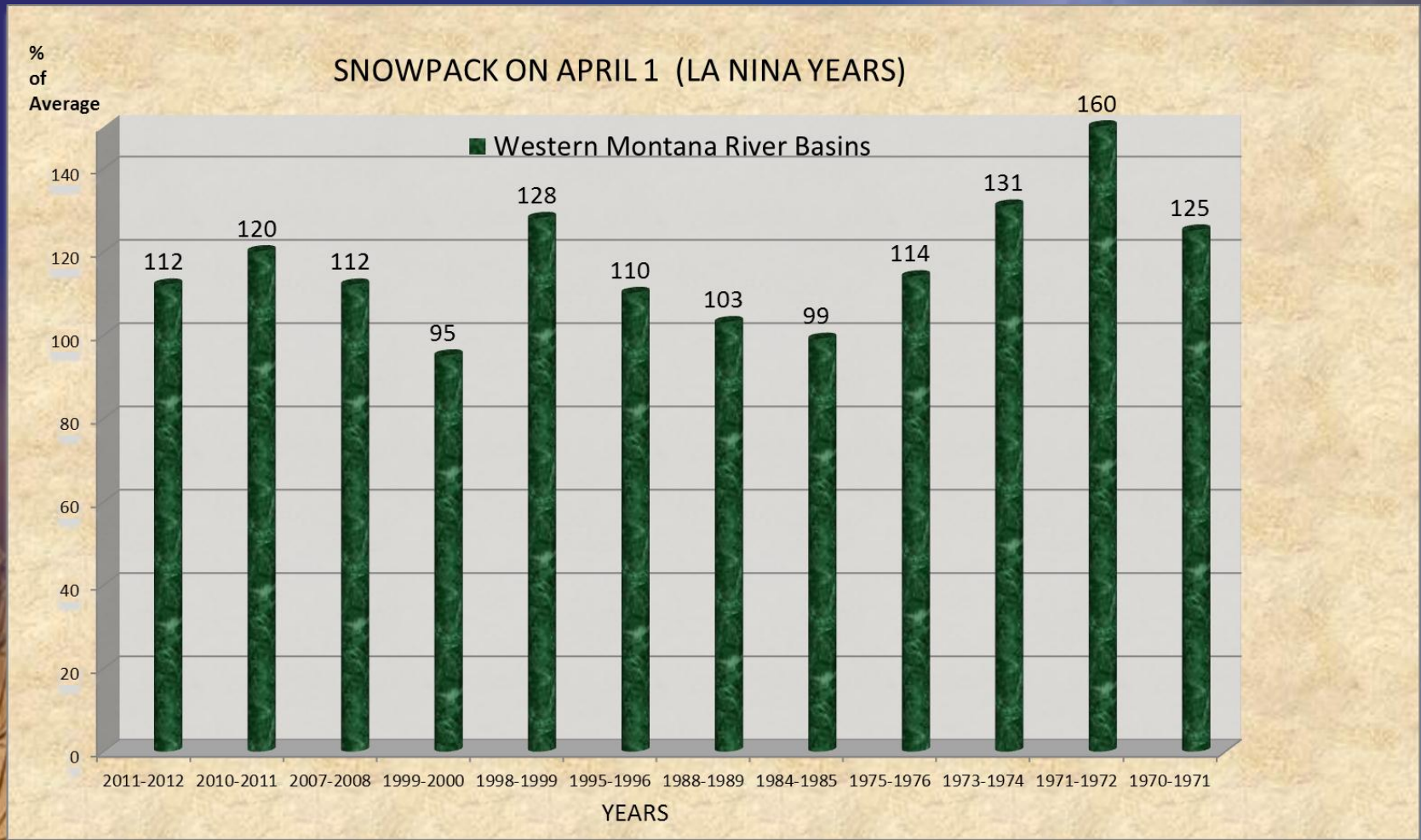


La Nina 2010 - 2011



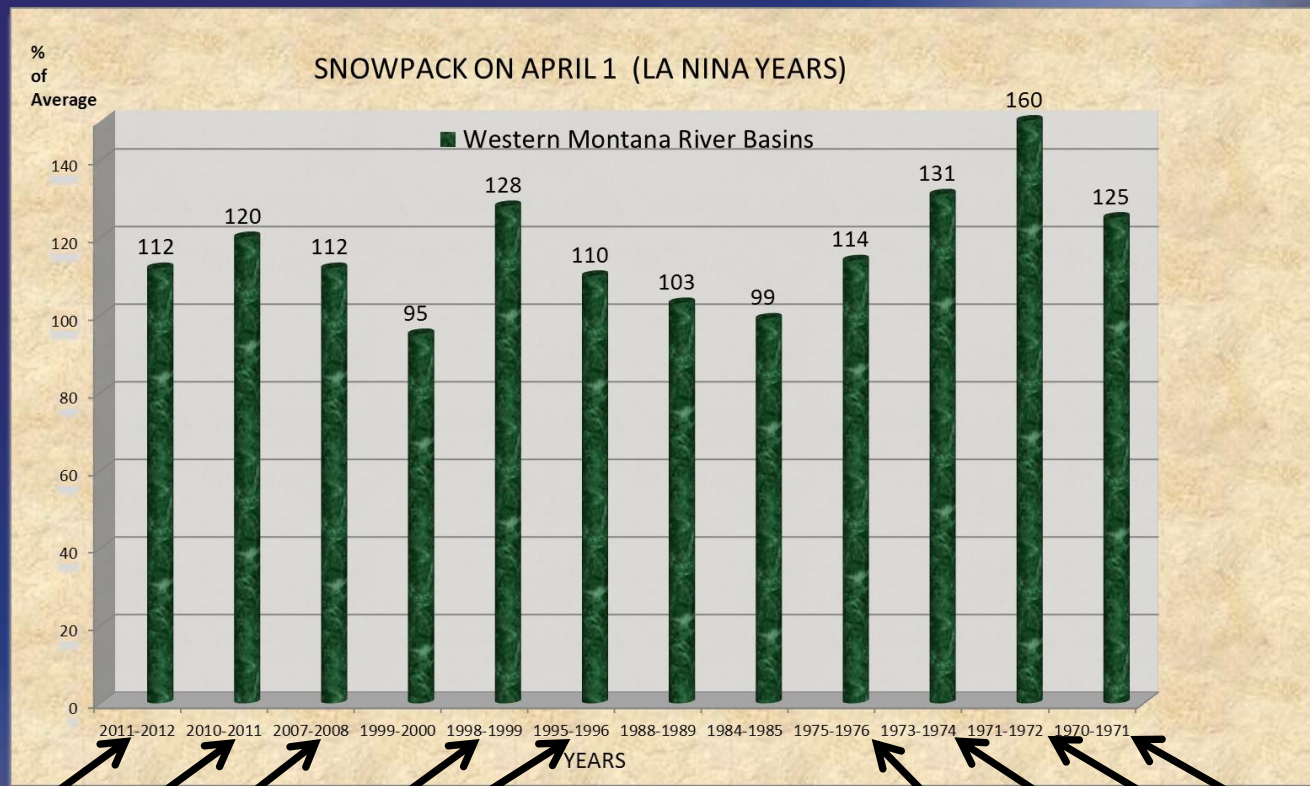


Snowpack & La Nina





Snowpack & Flooding

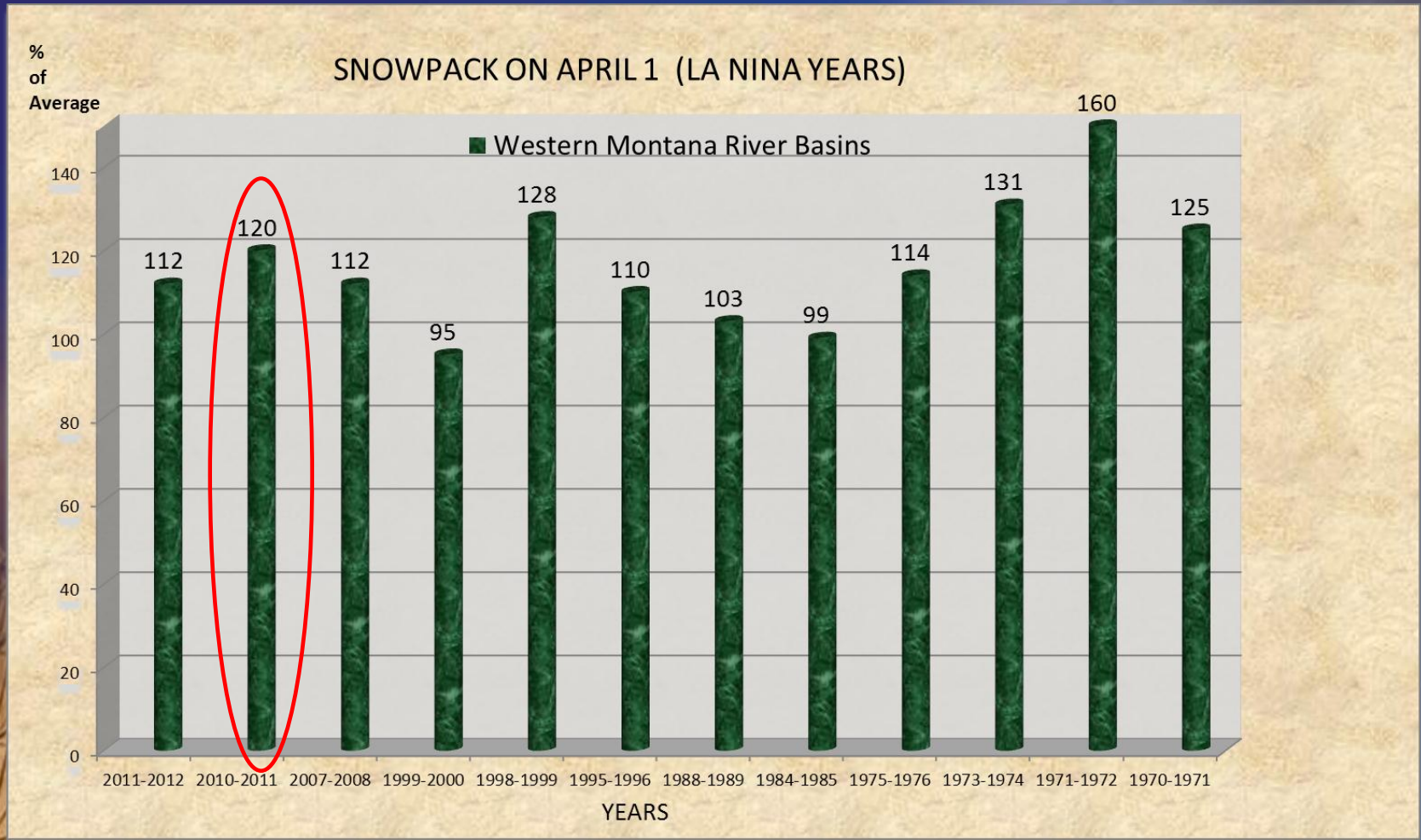


Flooding Occurred
9 of 12 years





Snowpack & La Nina 2011



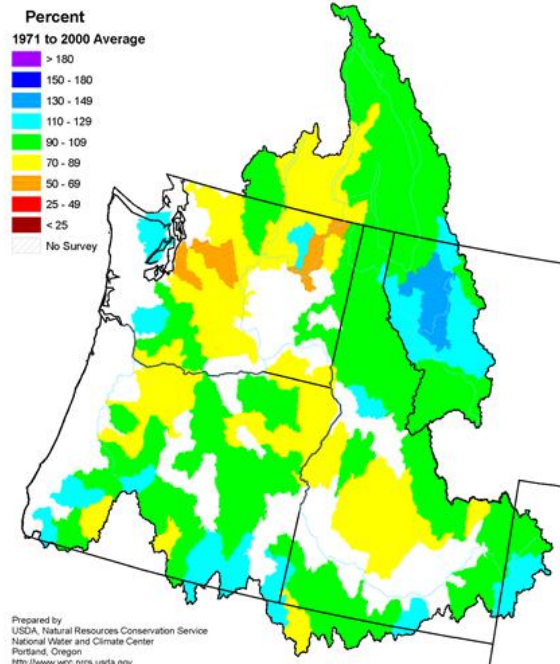


March - April - May (2011)

127% of Ave.

March

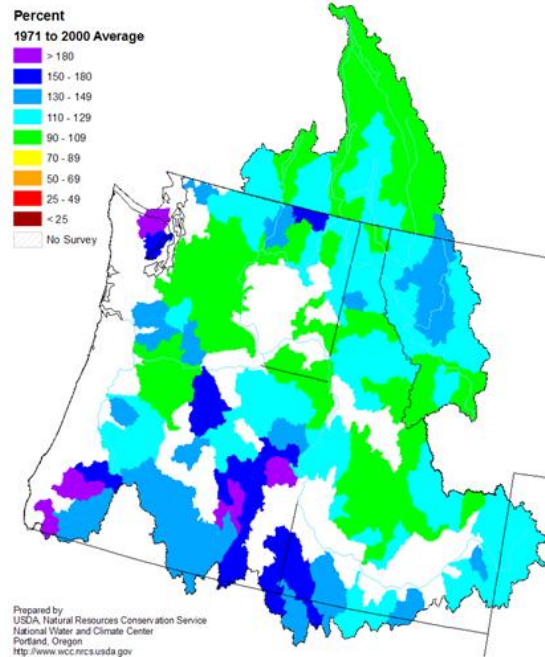
Columbia River Mountain Snowpack
as of March 1, 2011



132% of Ave.

April

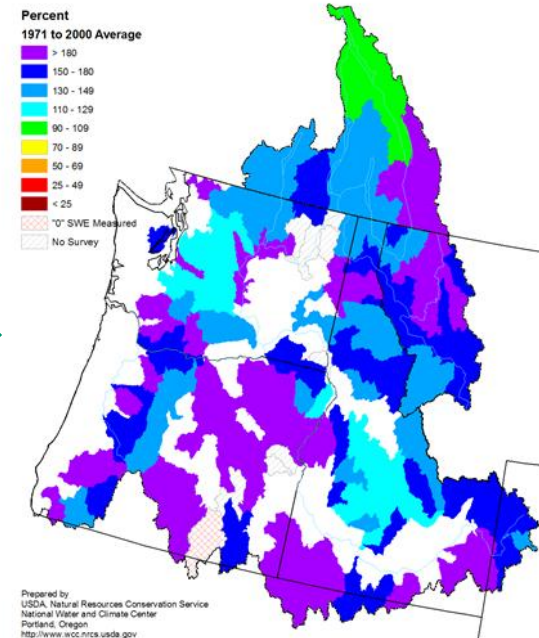
Columbia River Mountain Snowpack
as of April 1, 2011



178% of Ave.

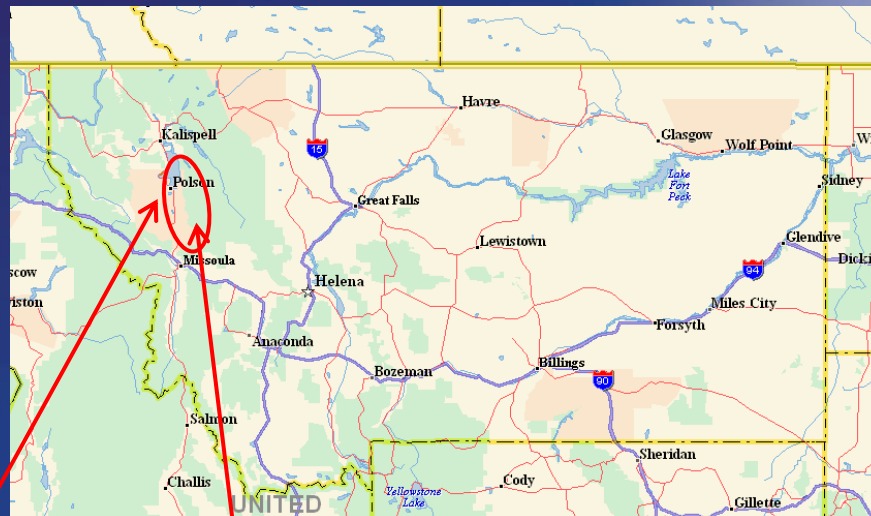
May

Columbia River Mountain Snowpack
as of May 1, 2011





February & March - 2011



Polson Snowstorm

weather.gov

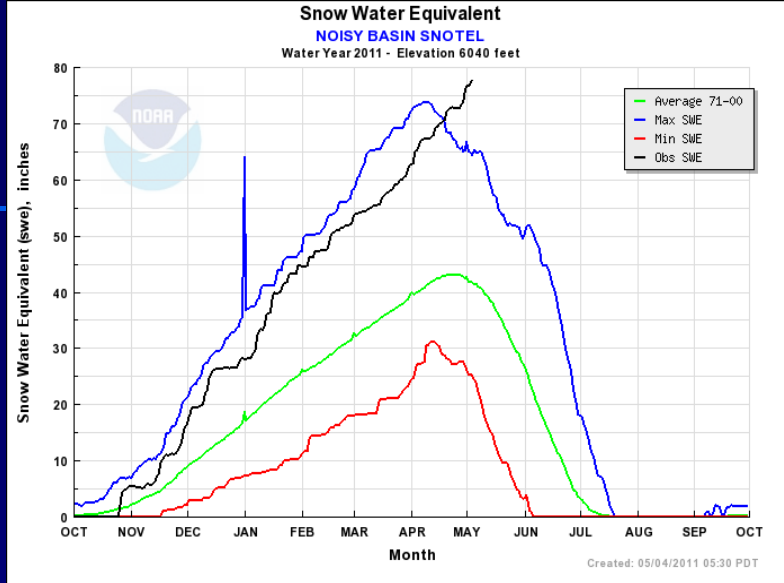
Mission Mountains 2011



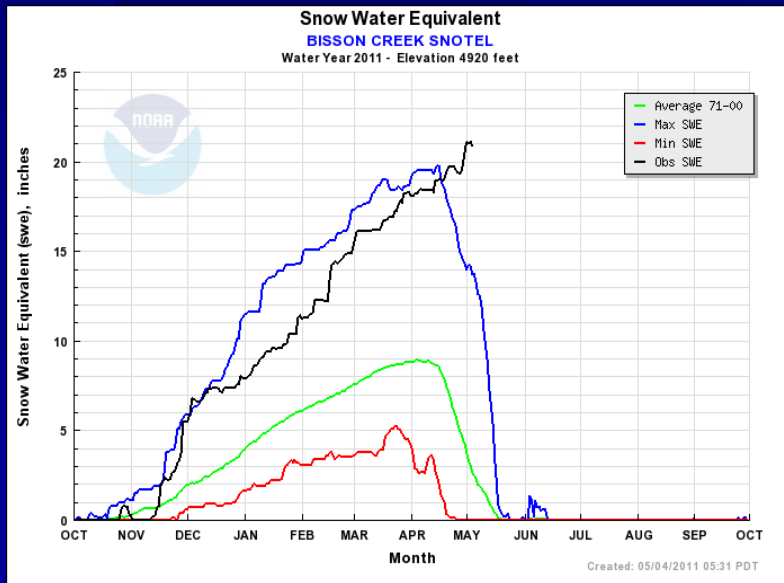
Snowpack 168% of Average

NOAA National Weather Service

Record Snowpack in some areas

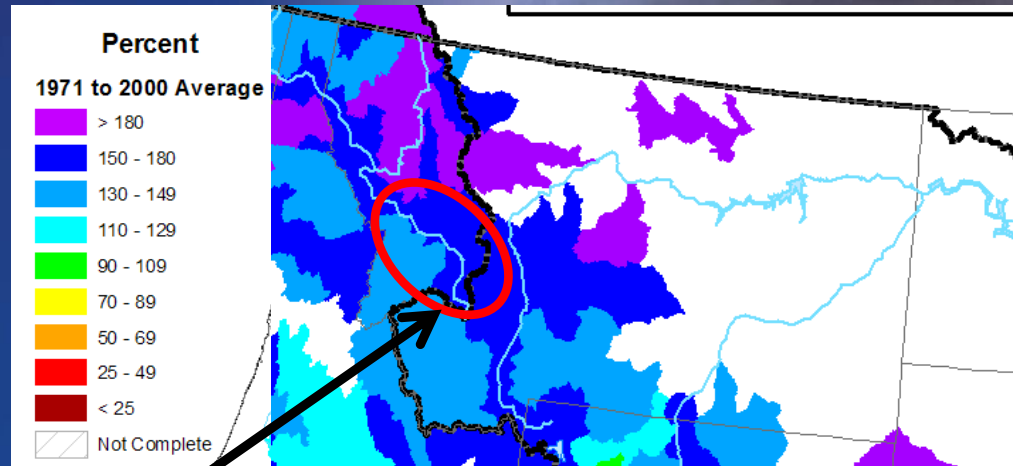


Glacier National Park – June 5, 2011



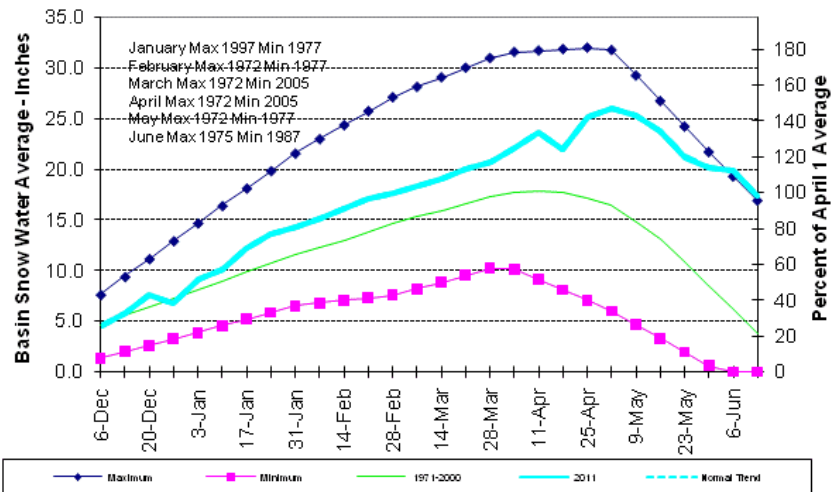


Clark Fork River Basin Snowpack



UPPER CLARK FORK RIVER BASIN

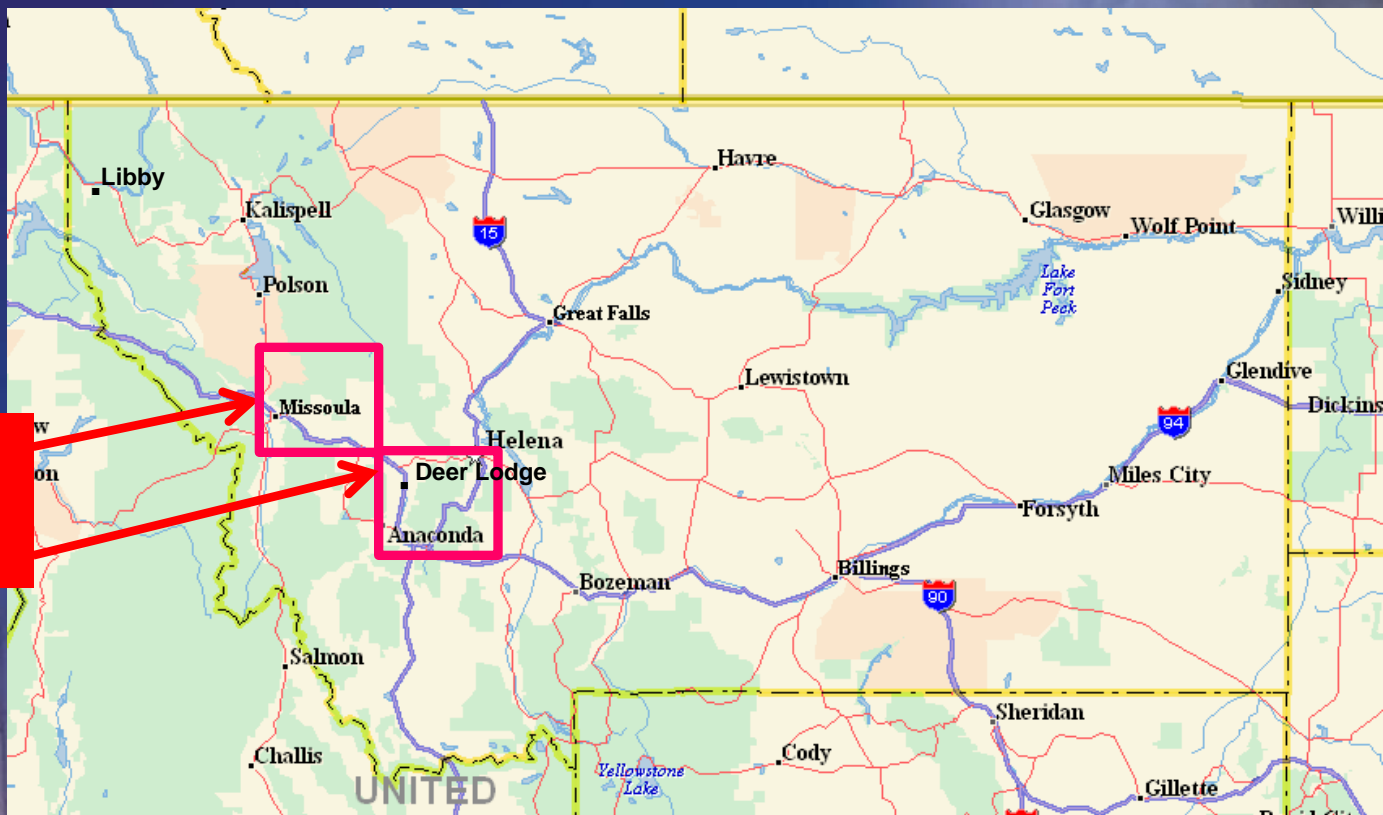
Based on provisional SNOTEL data - Subject to Revision
USDA, HRCS - Bozeman, Montana



Snowpack on May 1st = 150% of average



Clark Fork River Basin Flood of June - 2011

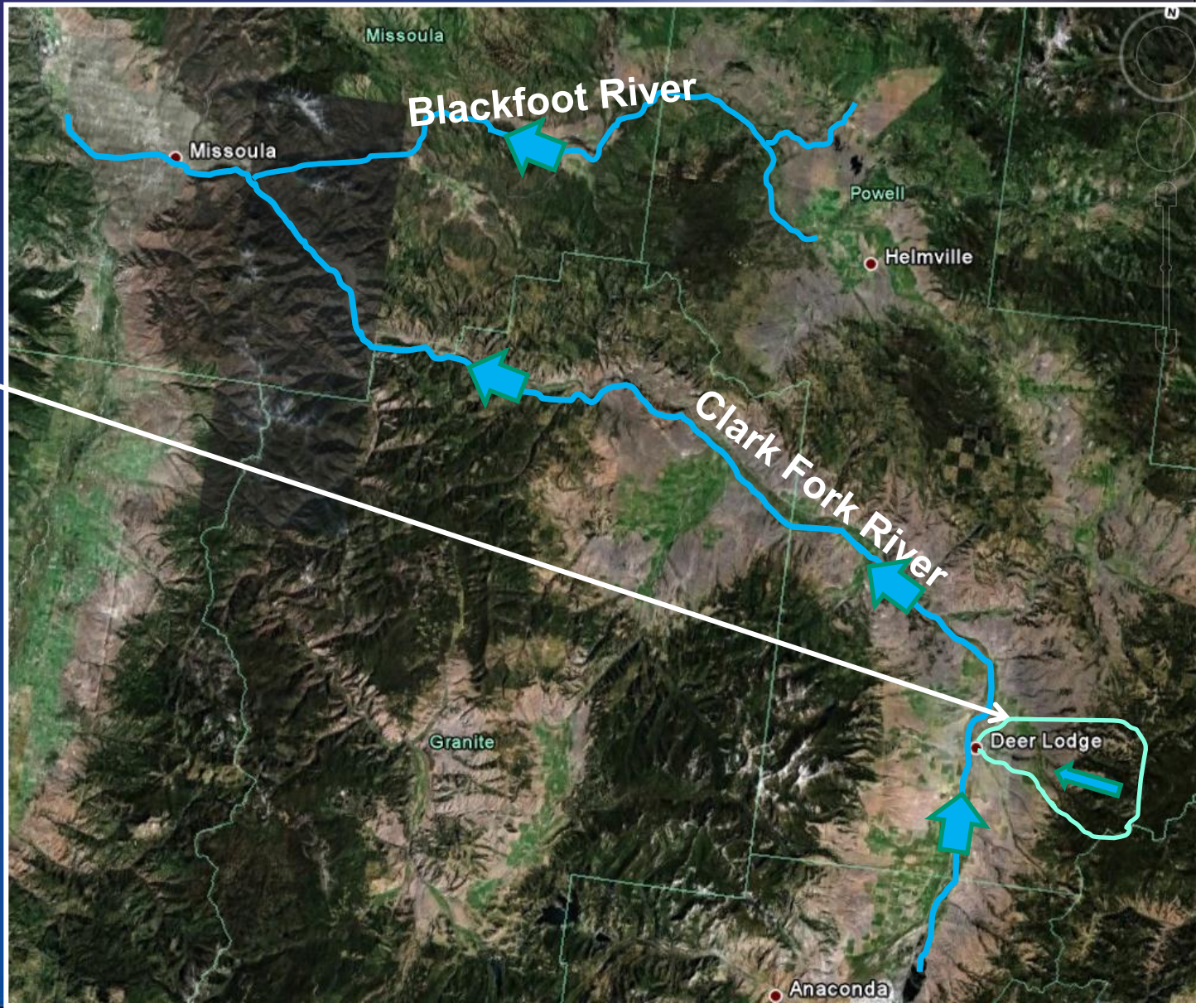


**Areas of
concern**



Cottonwood Creek Flood June 7th 2011

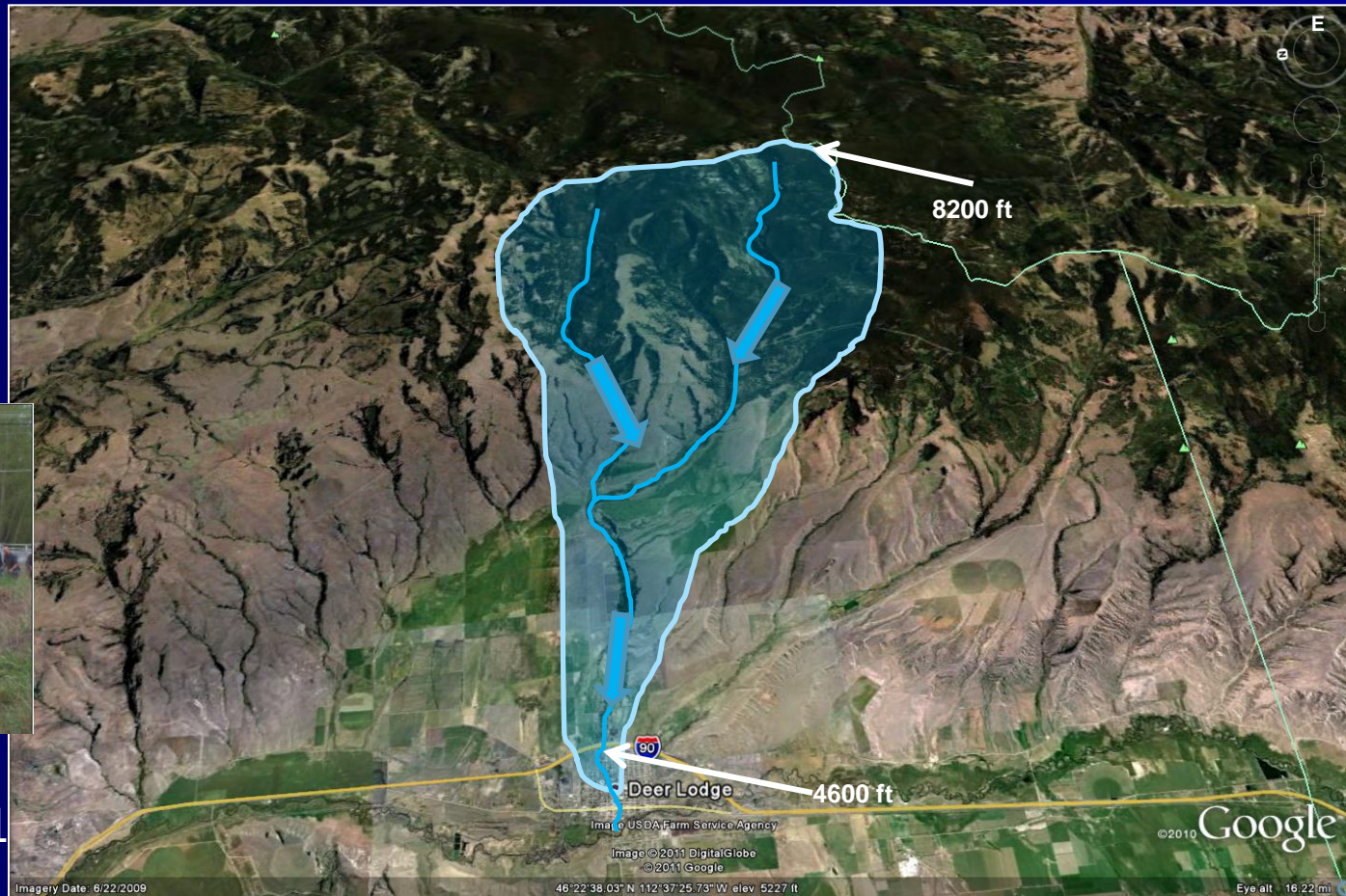
Cottonwood Creek



Cottonwood Creek Flood

June 7th 2011

Cottonwood Creek Basin – 45 square mi



Rain and snowmelt
event of June 7th 2011

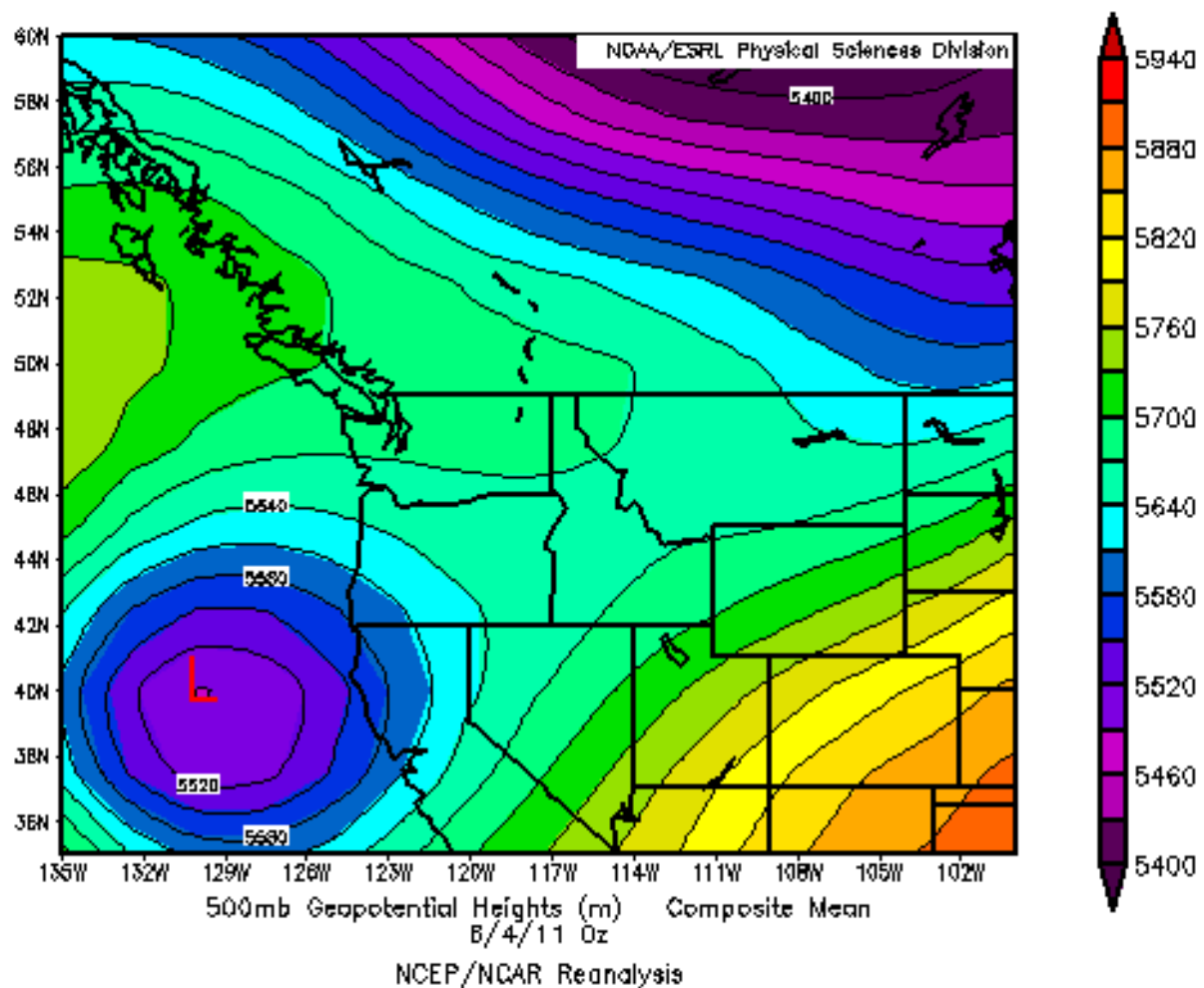


Weather Events

June 2011

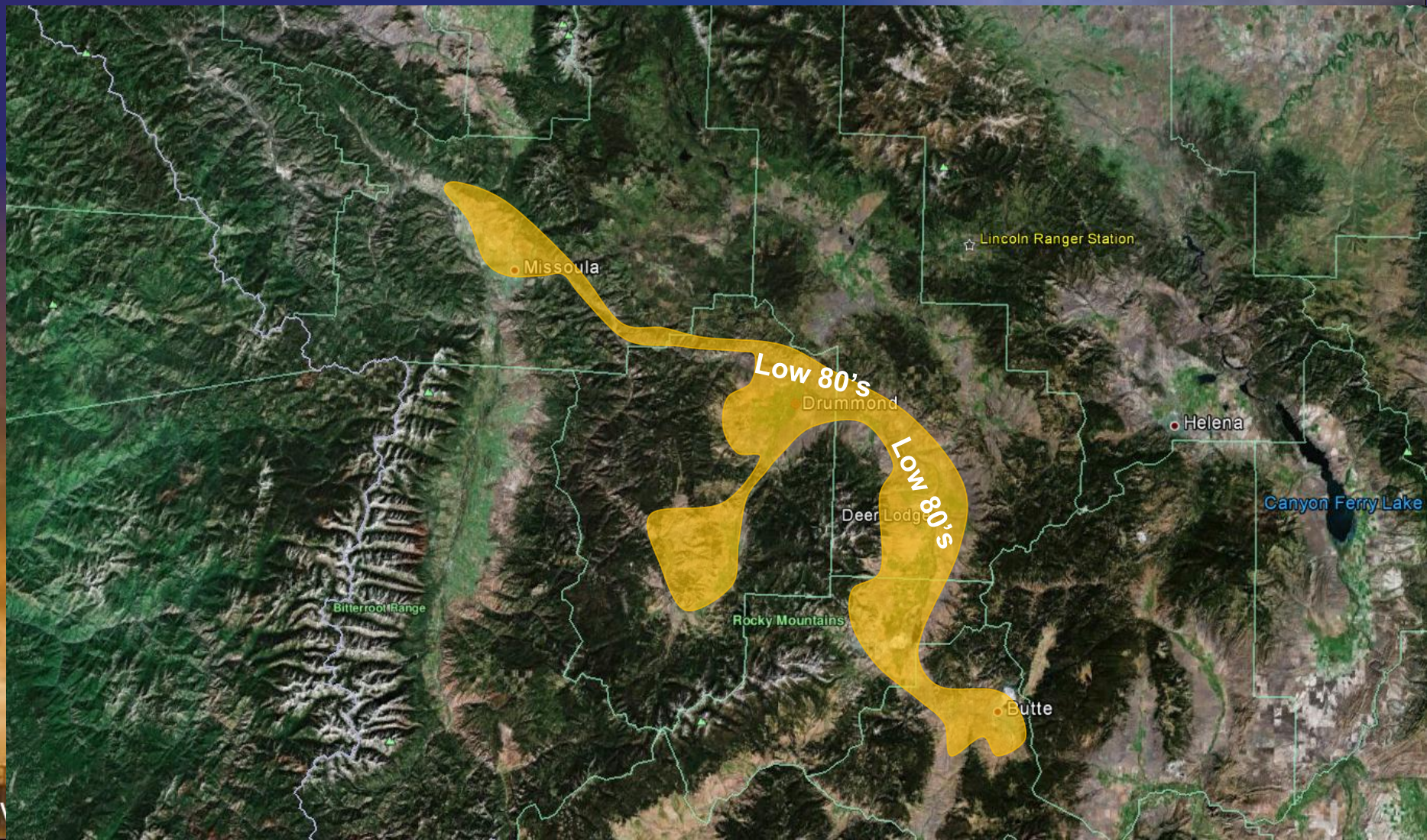


AdGIF UNREGISTERED - www.gif-animator.com





June 5th, 2011 – Warm Temperatures



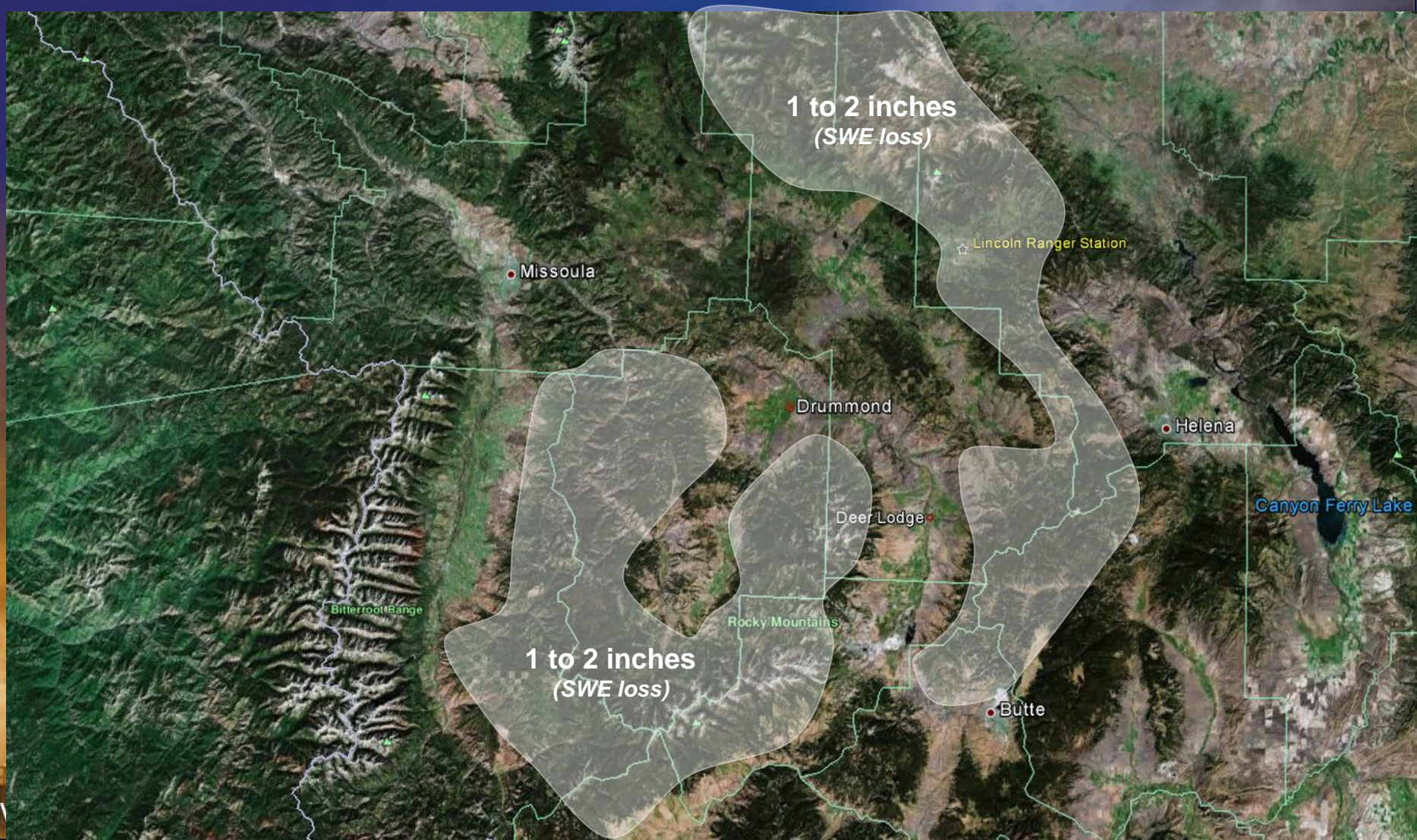


June 6th, 2011 – Warm Temperatures



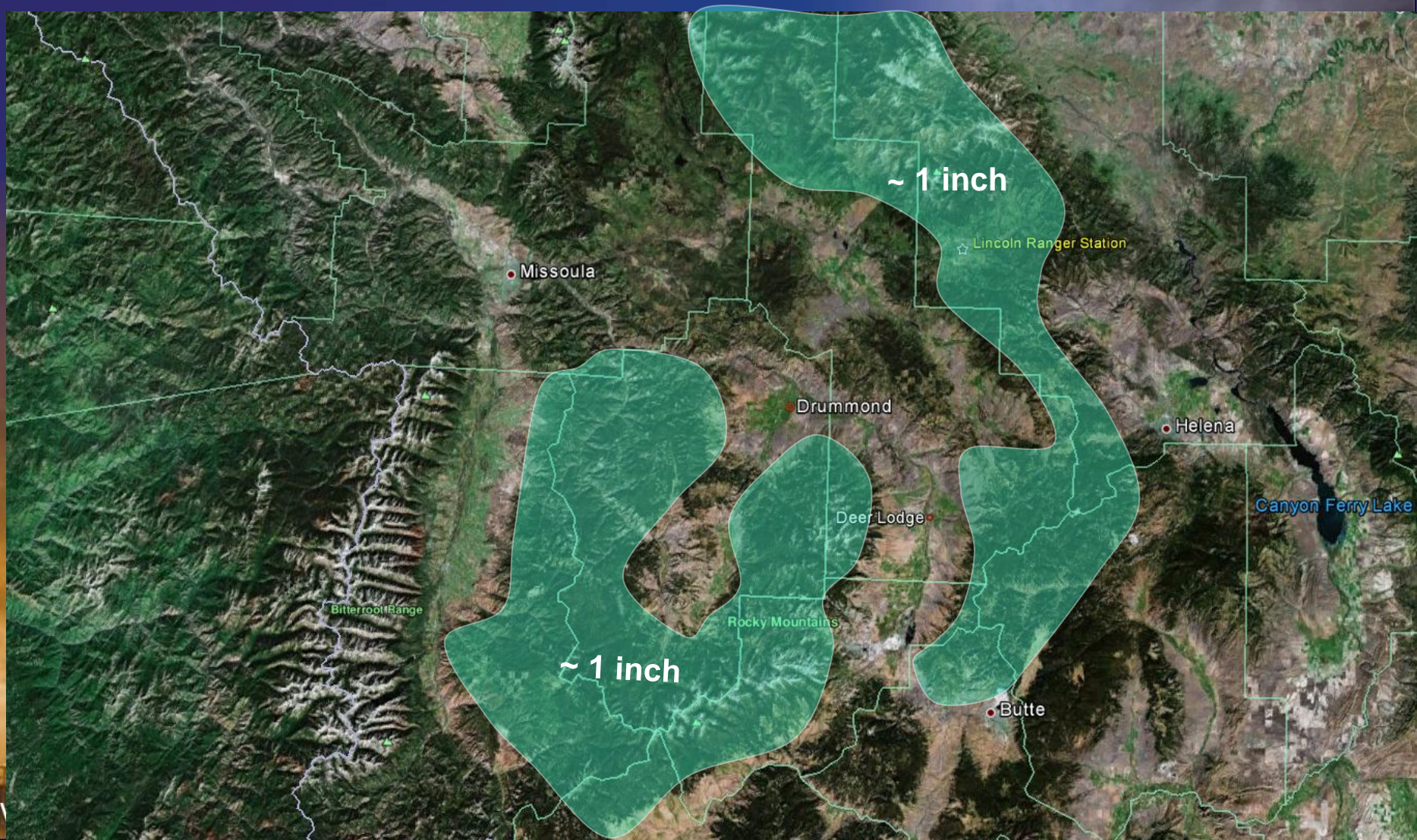


June 5th thru 6th, 2011 – Snow Water Equivalent Loss

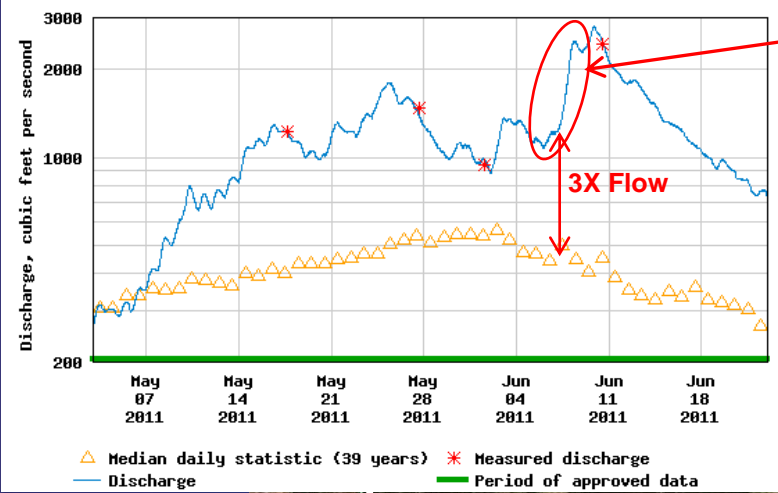




June 7th, 2011 - Rain Event (24hr)

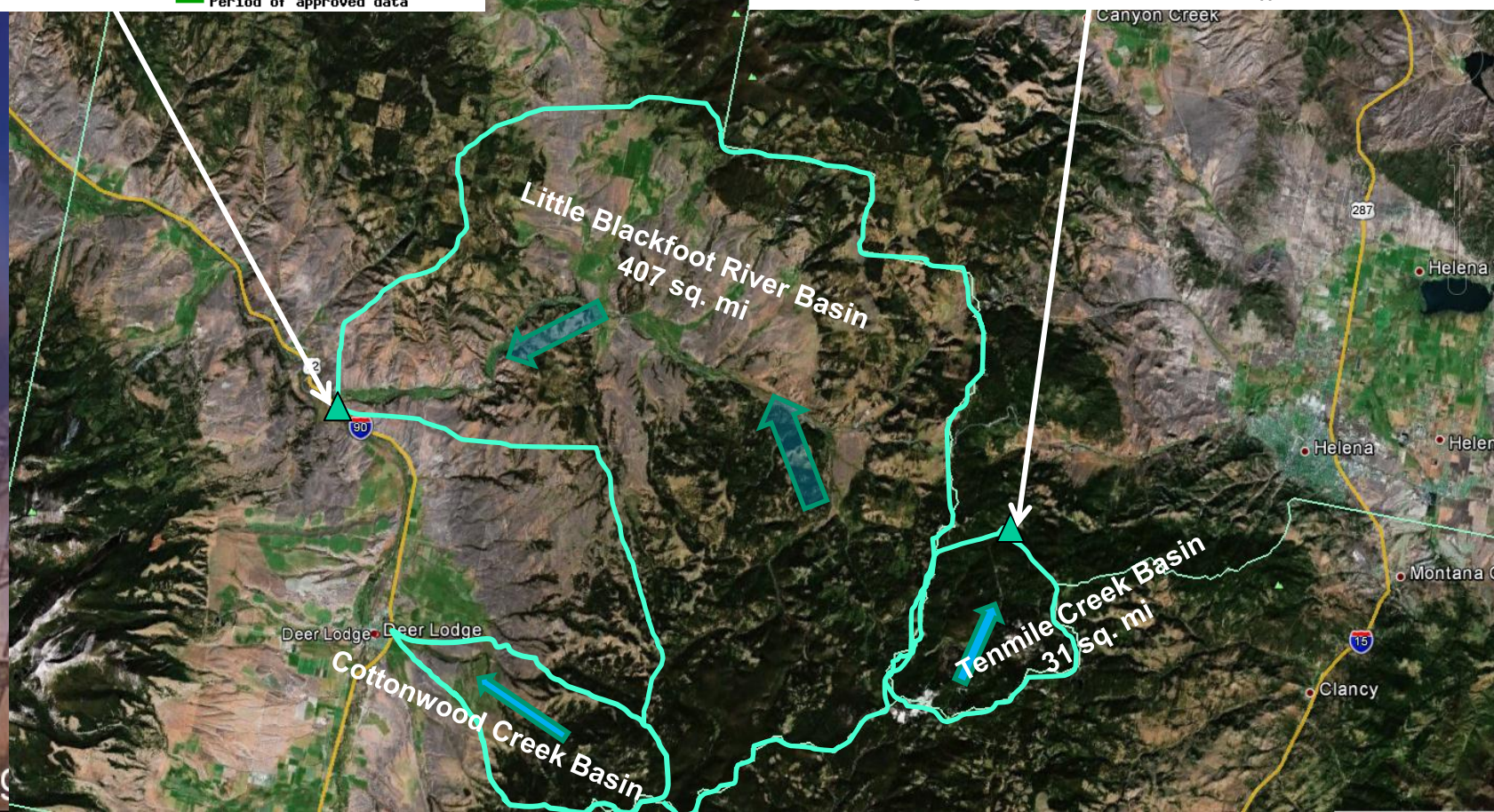
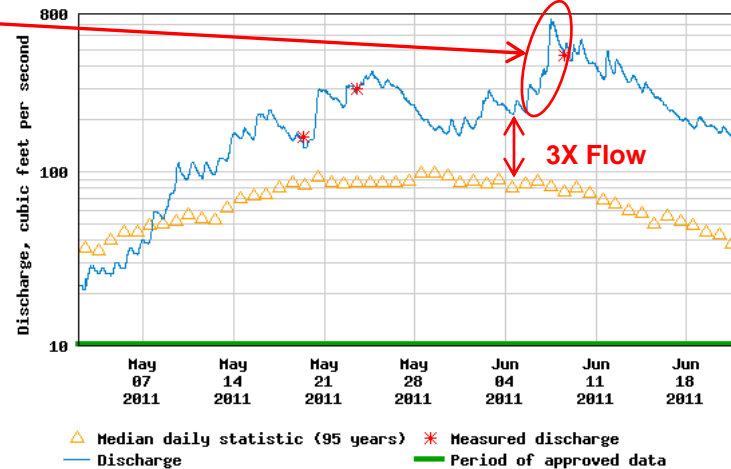


USGS 12324590 Little Blackfoot River near Garrison MT

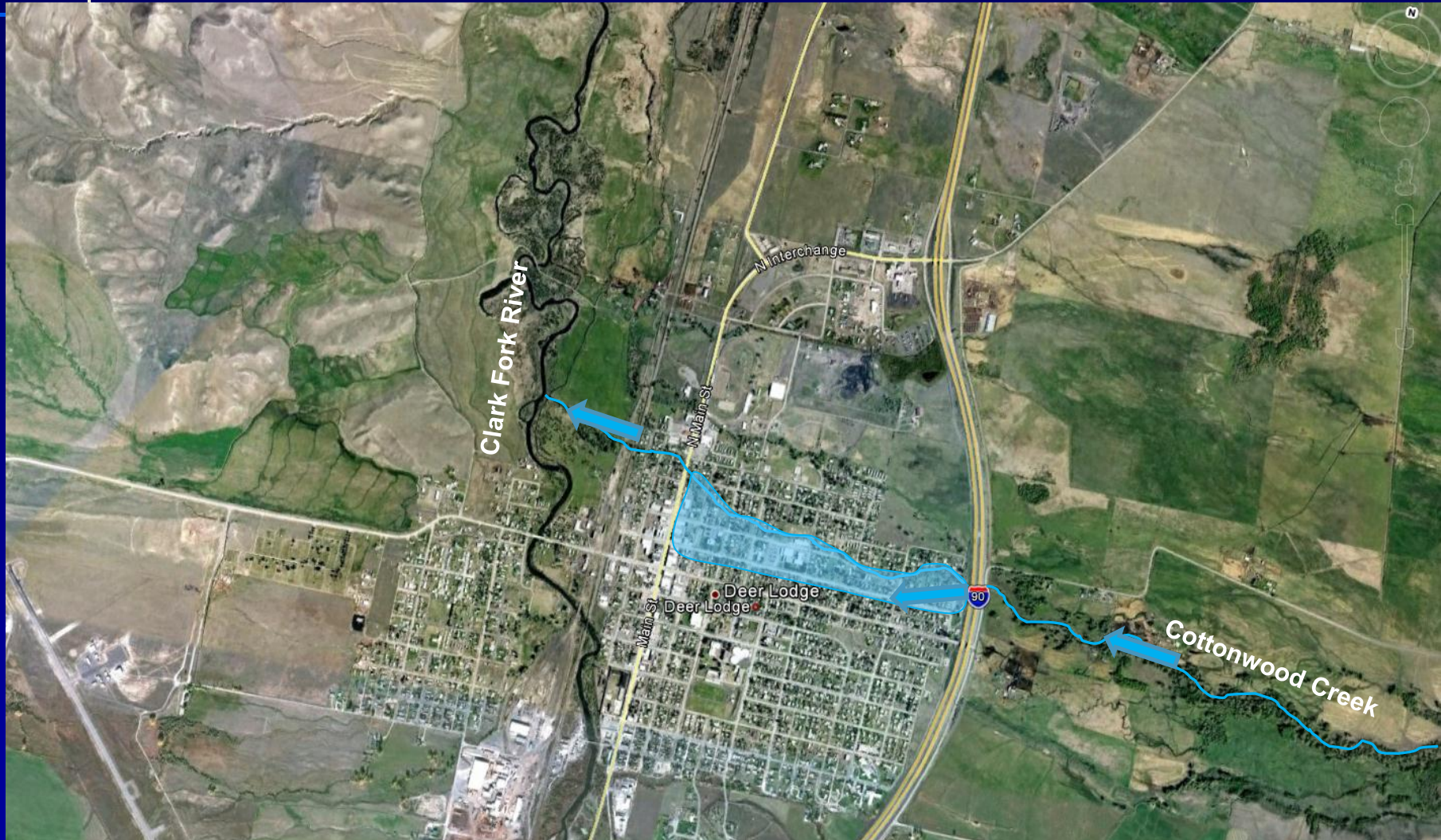


Rain & Snowmelt

USGS 06062500 Tennile Creek near Rimini MT



Cottonwood Creek Flood (Inundation) June 7th 2011



Cottonwood Creek Flood

June 7th 2011

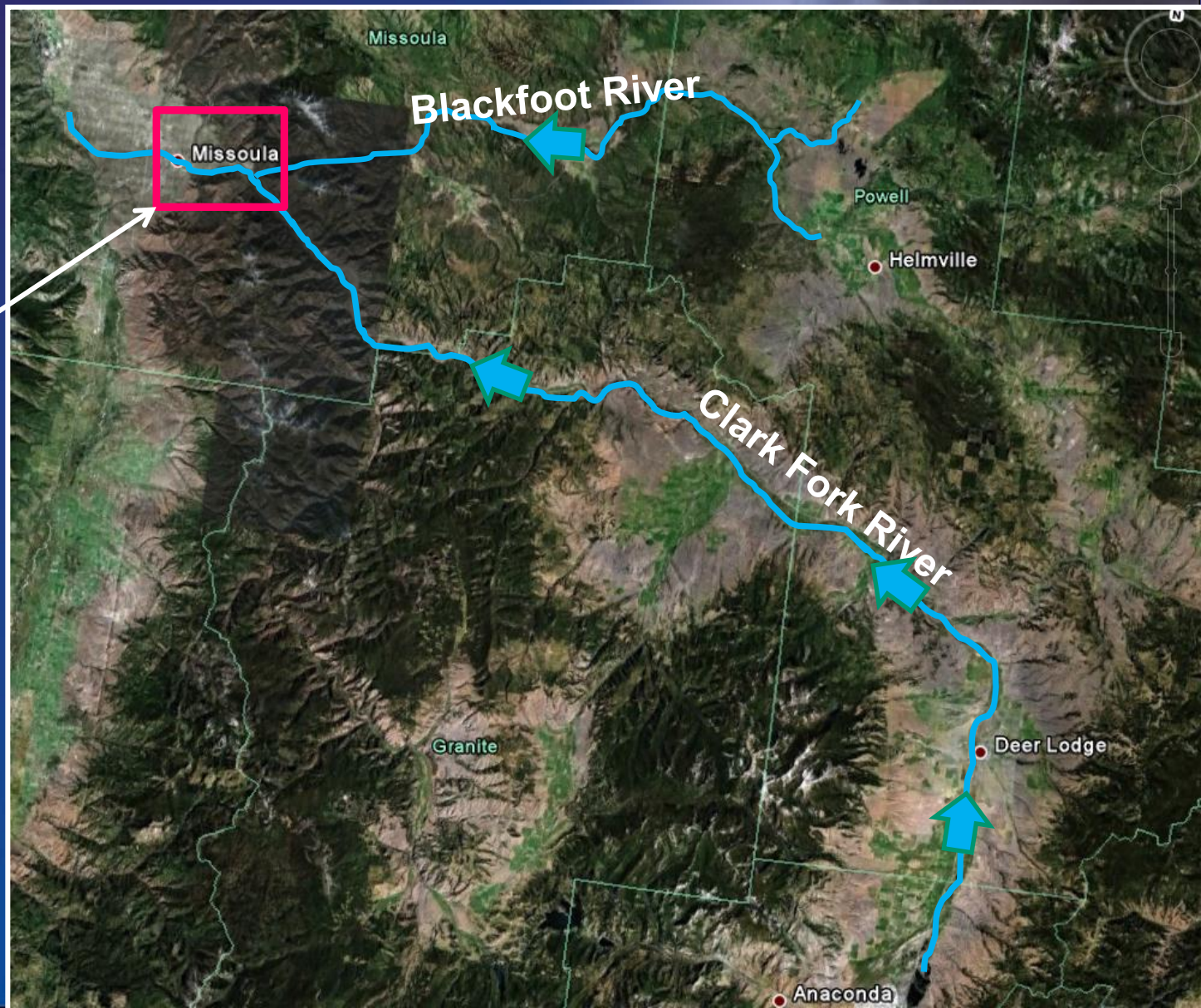
City streets and homes flooded on June 7th & 8th, 2011



Cottonwood Creek in Deer Lodge, MT



Clark Fork River Floods of June 2011 in Missoula

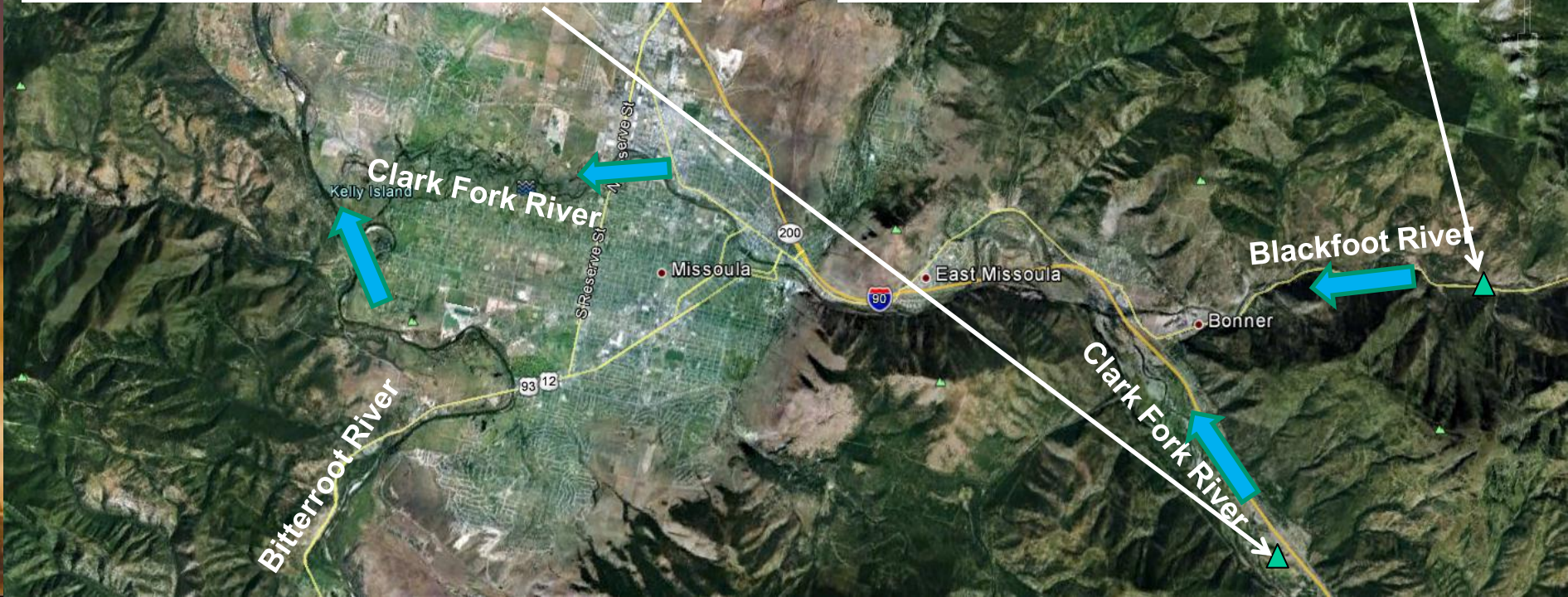
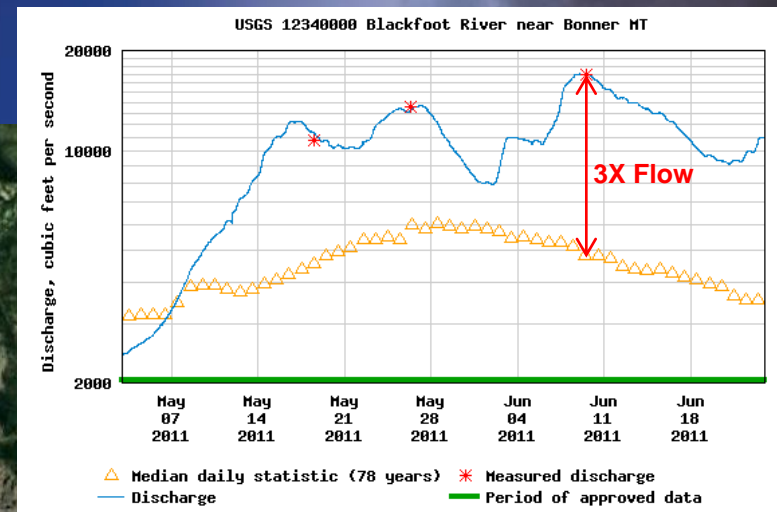
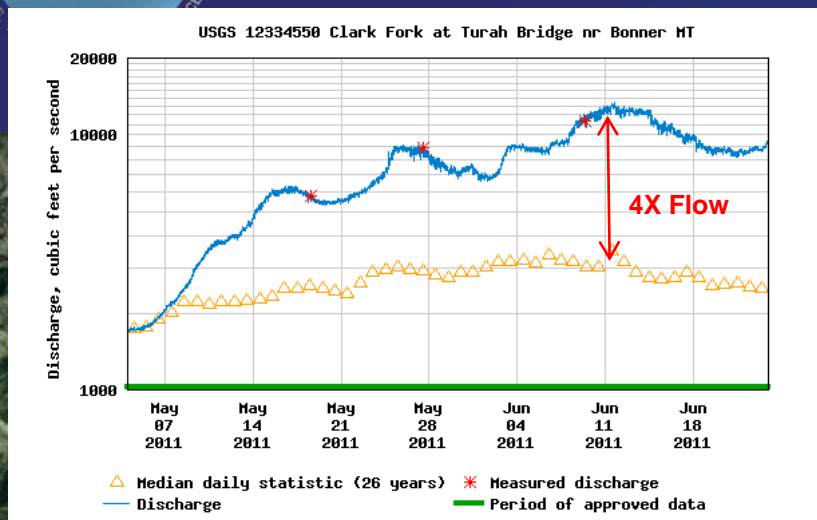


Biggest
Impact Flood



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Clark Fork River Floods of June 2011 in Missoula



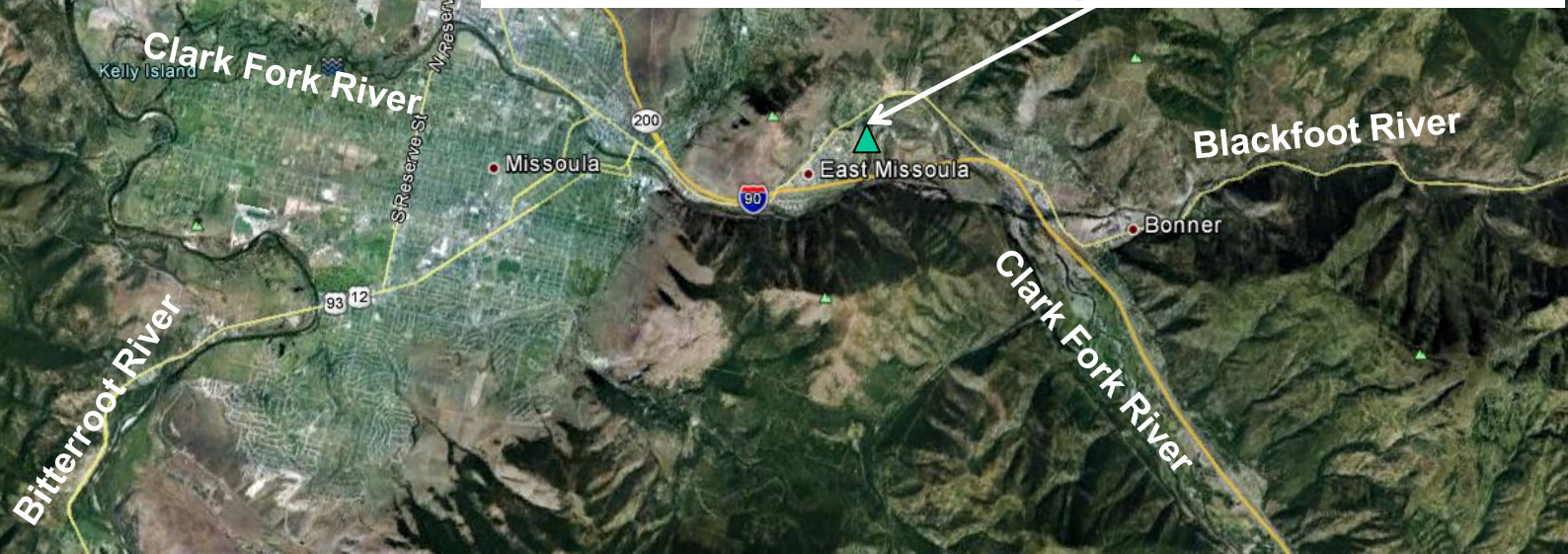
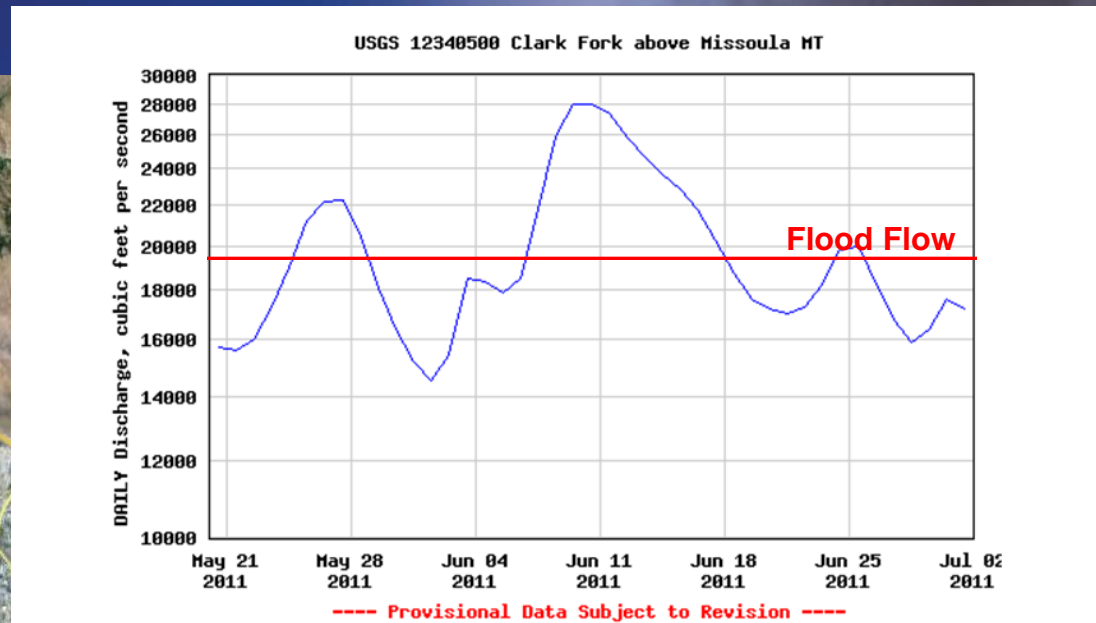
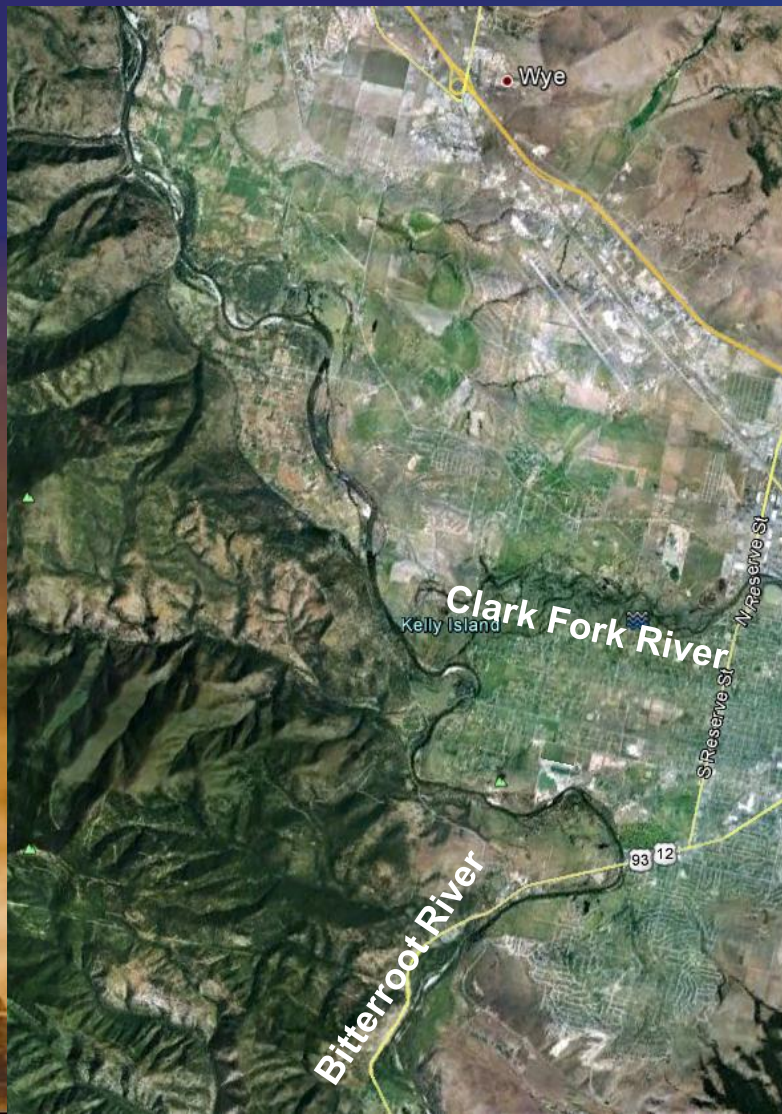


Clark Fork River

Floods of June 2011 in Missoula

Peak occurred
on June 9th @ 10pm

Above Flood Flow for
11 days



Clark Fork River Floods of June 2011 in Missoula

Biggest Impact Flood!!

Homes & Streets
Flooded in city of Missoula



Clark Fork River in Missoula



Clark Fork River Floods of June 2011 in Missoula

Damages

\$40,000 to Missoula city streets and FEMA home claims estimated to be ½ a million to 1 Million





Summary

- **La Nina years produce**
 - *Average to above average snowpack west of continental divide*
 - *Flooding 75% of time west of continental divide*



- **2011 Floods most damaging in Clark Fork River Basin**

DeerLodge



Missoula

